FCC Part 22
Transmitter Certification

Test Report

FCC ID: SO4YX500-CEL

FCC Rule Part: CFR 47 Part 22 Subpart H

ACS Report Number: 05-0343-22H

Manufacturer: Wireless Extenders
Equipment Type: Cellular Bi-Directional Booster
Model: YX500-CEL

Test Begin Date: September 27, 2005
Test End Date: September 30, 2005

Report Issue Date: October 10, 2005

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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This report contains **24** pages

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1.0 GENERAL

1.1 Purpose
The purpose of this report is to demonstrate compliance with Part 2 Subpart J and Part 22 Subpart H of the FCC's Code of Federal Regulations.

1.2 Product Description
The YX500-CEL is a Bi-Directional Amplifier (BDA) system which captures the signal arriving outside a consumer's home and amplifies it inside the home, as well as capturing the signal from the user's phone and amplifying it to the outdoor network. The YX500-CEL handles all applicable air-interface protocols including TDMA, GSM, CDMA, and AMPS. It includes multiple patent pending technologies to prevent interference. The combination of low gain and low NF means that it will not raise the BTS's Noise Floor and the YX500-CEL has a signal delay similar to multipath making it transparent to the wireless network.

Detailed photographs of the EUT are filed separately with this filing.

1.3 Technical Specifications

Table 1.3-1: Specifications

Frequency	824 – 894 MHz
Networks	CDMA, GSM, AMPS, and TDMA
Total Signal Gain	57dB (adaptive)
Power Input	0 – 240 VAC, 50/60Hz
Power Output	5VDC, 2.0A
Output Power (w/ included antenna & coax)	Uplink: 0.5W EIRP
	Downlink: 10mW EIRP
Base Unit antenna cable:	50 Ω coaxial cable, TNC male
Signal Antenna Cable	Outdoor rated 75Ω DBS satellite coaxial cable, F male

1.4 EUT Operating Configuration and Test Conditions
The EUT was configured and tested utilizing the maximum input drive level resulting in maximum gain conditions for all tests. If the maximum input drive level is exceeded, internal attenuators are activated to produce a level RF output and eliminate the device from operating beyond the maximum RF output power that is below the saturated RF output power.

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 89450
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20’ x 30’ x 18’ shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8’ copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25’ from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3’ x 6’ x 4’ deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4” PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

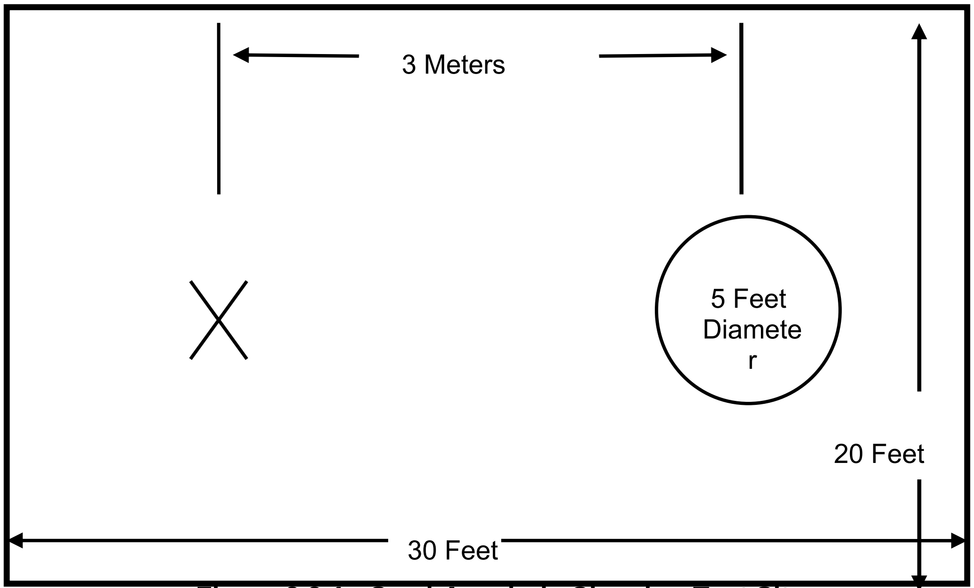

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40’ x 66’ concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8” holes that are staggered every 3/16”. The individual sheets are placed to overlap each other by 1/4” and are riveted together to provide a continuous seam. Rivets are spaced every 3” in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12’ beyond the turntable edge and 16’ beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8’ copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10’ flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40’ from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7’ x 7’ square and 4’ deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4” PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

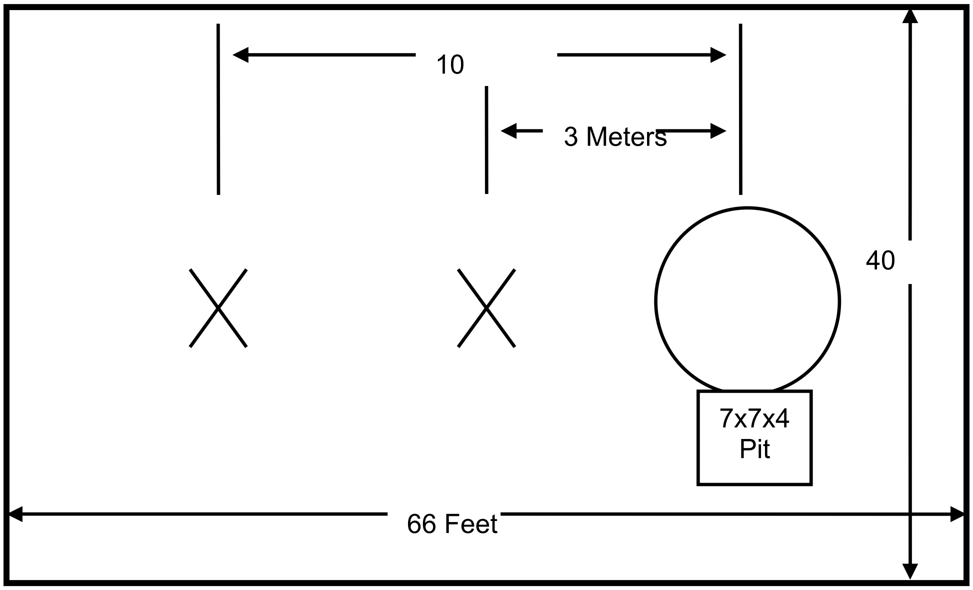

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is a shielded room with the following dimensions:

- Height: 3.0 Meters
- Width: 3.6 Meters
- Length: 4.9 Meters

The room is manufactured by Rayproof Corporation and installed by Panashield, Inc. Earth ground is provided to the room via an 8' copper ground rod. Each panel of the room is connected electrically at intervals of 4".

Power to the room is filtered to prevent ambient noise from coupling to the EUT and measurement equipment. Filters are models 1B42-60P manufactured by Rayproof Corporation.

The room is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 2.4-1:

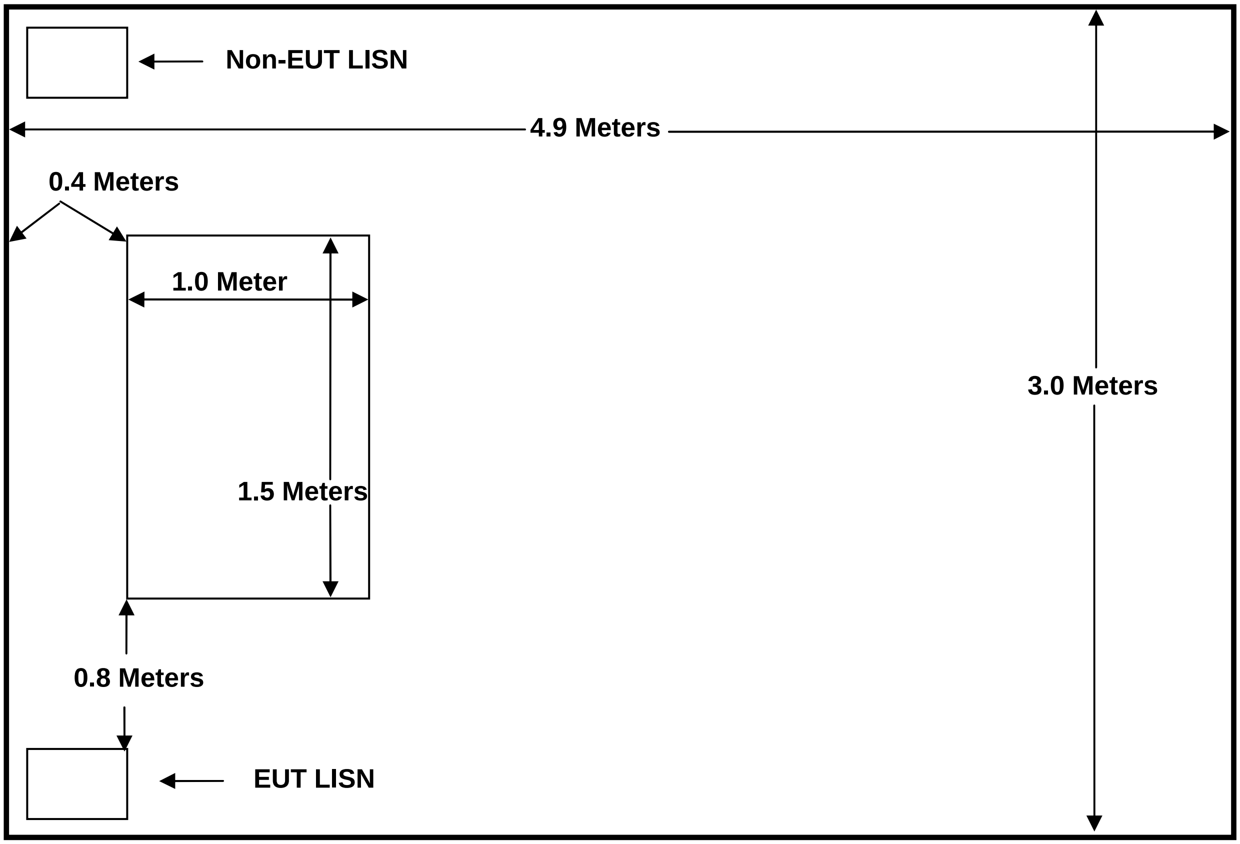

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

1 - ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz

2 - US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures (October 2004)

3 - US Code of Federal Regulations (CFR): Title 47, Part 22, Subpart H: Cellular Radiotelephone Service (October 2004)

4 - US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart B: Radio Frequency Devices, Unintentional Radiators (October 2004)

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
26	Chase	Bi-Log Antenna	CBL6111	1044	10/05/05
152	EMCO	LISN	3825/2	9111-1905	01/18/06
153	EMCO	LISN	3825/2	9411-2268	12/20/05
193	ACS	OATS Cable Set	RG8	193	01/07/06
225	Andrew	OATS RF cable	Heliax	225	01/06/06
165	ACS	Conducted EMI Cable Set	RG8	165	01/06/06
22	Agilent	Pre-Amplifier	8449B	3008A00526	05/06/06
73	Agilent	Pre-Amplifier	8447D	272A05624	05/18/06
30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	05/09/06
NA	EMCO	Horn Antenna	3115	9512-4636	NA
105	Microwave Circuits	High Pass Filter	H1G810G1	2123-01 DC0225	06/09/06
209	Microwave Circuits	High Pass Filters	H3G020G2	4382-01 DC0421	06/09/06
1	Rohde & Schwarz	Receiver	804.8932.52	833771/007	02/26/06
2	Rohde & Schwarz	Receiver	1032.5640.53	839587/003	02/26/06
3	Rohde & Schwarz	ESMI Receiver	804.8932.52	839379/011	12/15/05
4	Rohde & Schwarz	ESMI Receiver	1032.5640.53	833827/003	12/15/05
168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	01/06/06
93	Chase	EM Clamp	CIC 8101	65	01/06/06
204	ACS	Cable	RG8	204	12/29/05
6	Harbour Industries	HF RF Cable	LL-335	00006	03/16/06
7	Harbour Industries	HF RF Cable	LL-335	00007	03/16/06
208	Harbour Industries	HF RF Cable	LL142	00208	06/24/06
237	Gigatronics	Signal Generator	900	282706	01/03/06
176	Weinschel	30 dB Attenuator	46-30-34	BN4922	1/10/2006
N/A	Termaline	Coaxial Resistor 100W	8164	7655	N/A
167	ACS	Chamber EMI Cable Set	RG6	167	12/29/05
204	ACS	Chamber EMI RF cable	RG8	204	01/07/06
NA	Rohde & Schwarz	Signal Generator	SMIQ	DE24242	04/04/06
NA	Rohde & Schwarz	Signal Generator	SMIQ	DE22078	NA

* Note: No calibration required – used for pre-scan data only

5.0 SUPPORT EQUIPMENT AND ACCESSORIES

Table 5-1: Support Equipment and Accessories

Diagram #	Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
1	Fairway Electronic Co.,LTD	100-240 V Power Supply	WT10A-050U	NA	NA
2	Fairway Electronic Co.,LTD	100-120 V Power Supply	WT10L-050	NA	NA
3	Fairway Electronic Co.,LTD	100-240 V Power Supply	WN10A-050	NA	NA
4	Rohde & Schwarz	Signal Generator	SMIQ	DE24242	NA
5	Rohde & Schwarz	Signal Generator	SMIQ	DE22078	NA

*** Note:** The power supplies listed above represent all the possible accessories that may be available with EUT when marketed or sold.

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

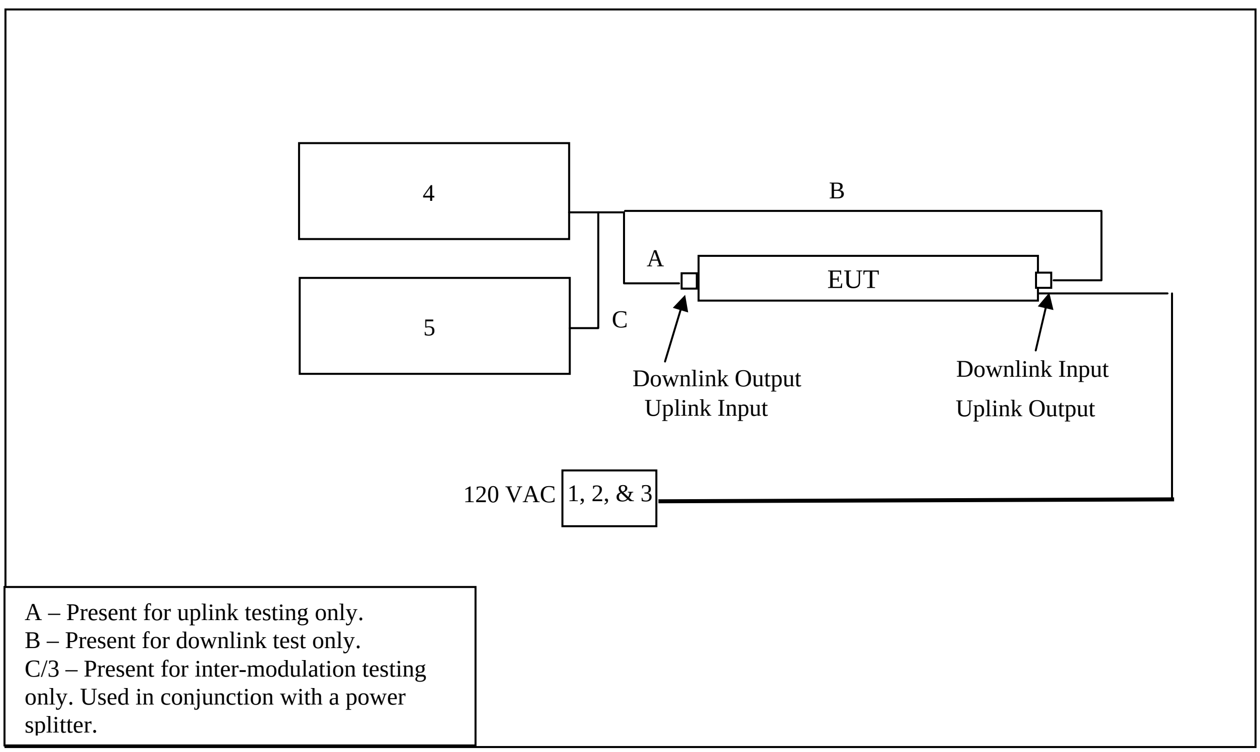

Figure 6-1: EUT Test Setup

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document. Data plots can be found in the test report appendix 05-0343-22H-A.

7.1 RF Power Output

7.1.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The resolution and video bandwidths of the spectrum analyzer were set at sufficient levels, >> emission bandwidth, to produce accurate results. The analyzer was set for Max Hold using a peak detector. Results for uplink and downlink configurations are shown below in Table 7.1-1.

7.1.2 Measurement Results

Table 7.1-1: Peak Output Power

Configuration	Modulation	Channel	Frequency (MHz)	RF Power Output (dBm)
Uplink	CDMA	Low	824.70	23.60
Uplink	CDMA	Middle	836.52	23.06
Uplink	CDMA	High	848.31	24.11
Uplink	TDMA	Low	824.04	22.70
Uplink	TDMA	Middle	836.52	22.87
Uplink	TDMA	High	848.97	23.36
Uplink	GSM	Low	824.20	26.12
Uplink	GSM	Middle	836.60	25.47
Uplink	GSM	High	848.80	26.13
Downlink	CDMA	Low	869.70	14.76
Downlink	CDMA	Middle	881.52	17.59
Downlink	CDMA	High	893.31	17.47
Downlink	TDMA	Low	869.04	12.08
Downlink	TDMA	Middle	881.52	11.78
Downlink	TDMA	High	893.97	11.92
Downlink	GSM	Low	869.20	15.15
Downlink	GSM	Middle	881.60	17.42
Downlink	GSM	High	893.80	17.69

7.2 Occupied Bandwidth (Emission Limits)

7.2.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The spectrum analyzer resolution and video bandwidths were set to 1% the emission bandwidth. The analyzer was set for Max Hold using a peak detector. Both the input and output bandwidths were evaluated to show similar characteristics of the emissions. Results for uplink and downlink configurations are shown below in Table 7.2-1.

7.2.2 Measurement Results

Occupied bandwidth plots are listed below and are supplied in the test report appendix 05-0343-22-A.

Table 7.2-1: Occupied Bandwidth

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Middle	836.52	Figure 1.
Uplink	TDMA	Middle	836.52	Figure 2.
Uplink	GSM	Middle	836.60	Figure 3.
Downlink	CDMA	Middle	881.52	Figure 4.
Downlink	TDMA	Middle	881.52	Figure 5.
Downlink	GSM	Middle	881.60	Figure 6.

7.3 Spurious Emissions at Antenna Terminals and Inter-modulation Products

7.3.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The two tone two test method was used with the device operating at maximum drive levels. Two tones were placed at both lower and upper band-edges and adjusted such that the third order harmonics were maximized and within the operating frequency band.

For in band measurements the spectrum analyzer resolution and video bandwidths were set to 1% the emission bandwidth. For out of band emissions the spectrum analyzer resolution and video bandwidths were set to 1 MHz according to Section 22.917 (b). The spectrum was investigated for the 30 MHz to 10 GHz in accordance to CFR 47 Part 2.1057. The analyzer was set for Max Hold using a peak detector. In band intermodulation data was collected at the lower band-edge and upper band-edge for uplink and downlink configurations using the two tone method. CW covers FM (GSM and F1D) for intermodulation products.

GSM modulation was included to show compliance for spurious emissions.

7.3.2 Measurement Results

Emission plots are listed below and are supplied in the test report appendix 05-0343-22-A.

Table 7.3-1: Spurious Emissions

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Uplink	CDMA	Low	In Band	Figure 7.
Uplink	CDMA	Low	30 – 2900	Figure 8.
Uplink	CDMA	Low	2900 - 20000	Figure 9.
Uplink	CDMA	Middle	30 – 2900	Figure 10.
Uplink	CDMA	Middle	2900 - 20000	Figure 11.
Uplink	CDMA	High	In Band	Figure 12.
Uplink	CDMA	High	30 – 2900	Figure 13.
Uplink	CDMA	High	2900 - 20000	Figure 14.
Uplink	TDMA	Low	In Band	Figure 15.
Uplink	TDMA	Low	30 – 2900	Figure 16.
Uplink	TDMA	Low	2900 - 20000	Figure 17.
Uplink	TDMA	Middle	30 – 2900	Figure 18.
Uplink	TDMA	Middle	2900 - 20000	Figure 19.
Uplink	TDMA	High	In Band	Figure 20.
Uplink	TDMA	High	30 – 2900	Figure 21.
Uplink	TDMA	High	2900 - 20000	Figure 22.
Uplink	CW	Low	In Band	Figure 23.
Uplink	CW	Low	30 – 2900	Figure 24.
Uplink	CW	Low	2900 - 20000	Figure 25.
Uplink	CW	High	In Band	Figure 26.
Uplink	CW	High	30 – 2900	Figure 27.
Uplink	CW	High	2900 - 20000	Figure 28.
Uplink	GSM	Low	30 – 2900	Figure 29.
Uplink	GSM	Low	2900 - 20000	Figure 30.
Uplink	GSM	Middle	30 – 2900	Figure 31.
Uplink	GSM	Middle	2900 - 20000	Figure 32.
Uplink	GSM	High	30 – 2900	Figure 33.
Uplink	GSM	High	2900 - 20000	Figure 34.

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Downlink	CDMA	Low	In Band	Figure 35.
Downlink	CDMA	Low	30 – 2900	Figure 36.
Downlink	CDMA	Low	2900 - 20000	Figure 37.
Downlink	CDMA	Middle	30 – 2900	Figure 38.
Downlink	CDMA	Middle	2900 - 20000	Figure 39.
Downlink	CDMA	High	In Band	Figure 40.
Downlink	CDMA	High	30 – 2900	Figure 41.
Downlink	CDMA	High	2900 - 20000	Figure 42.
Downlink	TDMA	Low	In Band	Figure 43.
Downlink	TDMA	Low	30 – 2900	Figure 44.
Downlink	TDMA	Low	2900 - 20000	Figure 45.
Downlink	TDMA	Middle	30 – 2900	Figure 46.
Downlink	TDMA	Middle	2900 - 20000	Figure 47.
Downlink	TDMA	High	In Band	Figure 48.
Downlink	TDMA	High	30 – 2900	Figure 49.
Downlink	TDMA	High	2900 - 20000	Figure 50.
Downlink	CW	Low	In Band	Figure 51.
Downlink	CW	Low	30 – 2900	Figure 52.
Downlink	CW	Low	2900 - 20000	Figure 53.
Downlink	CW	High	In Band	Figure 54.
Downlink	CW	High	30 – 2900	Figure 55.
Downlink	CW	High	2900 - 20000	Figure 56.
Downlink	GSM	Low	30 – 2900	Figure 57.
Downlink	GSM	Low	2900 - 20000	Figure 58.
Downlink	GSM	Middle	30 – 2900	Figure 59.
Downlink	GSM	Middle	2900 - 20000	Figure 60.
Downlink	GSM	High	30 – 2900	Figure 61.
Downlink	GSM	High	2900 - 20000	Figure 62.

7.4 Band-edge Compliance

7.4.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The spectrum analyzer resolution and video bandwidths were set to 1% the emission bandwidth. The analyzer was set for Max Hold using a peak detector. The center frequency was set to both the upper and lower cellular frequency block edges.

7.4.2 Measurement Results

Band-edge plots in are listed in Table 7.4-1below and are supplied in the test report appendix 05-0343-22-A.

Table 7.4-1: Band-edge

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	824.70	Figure 63.
Uplink	CDMA	High	848.31	Figure 64.
Uplink	TDMA	Low	824.04	Figure 65.
Uplink	TDMA	High	848.97	Figure 66.
Uplink	GSM	Low	824.20	Figure 67.
Uplink	GSM	High	848.80	Figure 68.
Downlink	CDMA	Low	869.70	Figure 69.
Downlink	CDMA	High	893.31	Figure 70.
Downlink	TDMA	Low	869.04	Figure 71.
Downlink	TDMA	High	893.97	Figure 72.
Downlink	GSM	Low	869.20	Figure 73.
Downlink	GSM	High	893.80	Figure 74.

7.5 Field Strength of Spurious Emissions

7.5.1 Measurement Procedure

The equipment under test is placed on the Open Area Test Site (described in section 2.1) on a wooden table at the turntable center. For each spurious emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360º and the maximum reading on the spectrum analyzer is recorded. This repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. The signal generator's frequency is set to that of the spurious emission recorded from the equipment under test. The antenna mast is raised and lowered from one (1) to four (4) meters to obtain a maximum reading on the spectrum analyzer. The output of the signal generator is then adjusted until the reading on the spectrum analyzer matches that obtained from the equipment under test. The signal generator level is recorded.

The power in dBm of each spurious emission is calculated by correcting the signal generator level for the cable loss and gain of the substitution antenna referenced to a dipole. The spectrum was investigated in accordance to CFR 47 Part 2.1057. A CW was used for both uplink and downlink for low, middle and high channels. The worst case emissions are reported of both uplink and downlink configurations. All emissions not reported were below the noise floor of the measurement equipment.

Results of the test are shown below in Table 7.5-1 and Table 7.5.2.

7.5.2 Measurement Results

Uplink

Table 7.5.-1: Field Strength of Spurious Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel							
1648	-57.00	-61.00	H	5.31	-55.69	-13.00	42.69
1648	-56.49	-58	V	5.31	-52.69	-13.00	39.69
2472	-58.9	-61	H	5.62	-55.38	-13.00	42.38
2472	-56.59	-55	V	5.62	-49.38	-13.00	36.38
3296	-59.33	-58	V	6.02	-51.98	-13.00	38.98
4120	-60.8	-57	V	5.91	-51.09	-13.00	38.09
4944	-61.64	-54	H	6.10	-47.90	-13.00	34.90
4944	-61.59	-57	V	6.10	-50.90	-13.00	37.90
5768	-60.31	-53	V	6.00	-47.00	-13.00	34.00
Mid Channel							
1673	-56.31	-58	H	5.32	-52.68	-13.00	39.68
1673	-54.38	-56	V	5.32	-50.68	-13.00	37.68
2509.5	-57.75	-58	H	5.64	-52.36	-13.00	39.36
2509.5	-54.96	-54	V	5.64	-48.36	-13.00	35.36
4182.5	-60.52	-55	H	6.05	-48.95	-13.00	35.95
4182.5	-58.64	-55	V	6.05	-48.95	-13.00	35.95
5019	-61.98	-57	H	6.02	-50.98	-13.00	37.98
5019	-60.88	-56	V	6.02	-49.98	-13.00	36.98
5855.5	-59.09	-52	V	6.02	-45.98	-13.00	32.98
High Channel							
1698	-55.71	-55	H	5.33	-49.67	-13.00	36.67
1698	-53.78	-53	V	5.33	-47.67	-13.00	34.67
2547	-57.85	-58	H	5.66	-52.34	-13.00	39.34
2547	-57.11	-57	V	5.66	-51.34	-13.00	38.34
3396	-59.87	-57	V	6.05	-50.95	-13.00	37.95
4245	-57.34	-53	V	6.18	-46.82	-13.00	33.82
5094	-59.75	-53	V	6.00	-47.00	-13.00	34.00
5943	-57.8	-47	V	6.04	-40.96	-13.00	27.96

Downlink

Table 7.5.-2: Field Strength of Spurious Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel							
1738	-58.32	-59.00	H	5.35	-53.65	-13.00	40.65
1738	-55.22	-54	V	5.35	-48.65	-13.00	35.65
2607	-57.16	-59	H	5.70	-53.30	-13.00	40.30
2607	-53.55	-51	V	5.70	-45.30	-13.00	32.30
3476	-59.47	-59	H	6.07	-52.93	-13.00	39.93
3476	-59.13	-56	V	6.07	-49.93	-13.00	36.93
4345	-54.08	-48	H	6.40	-41.60	-13.00	28.60
4345	-50.83	-42	V	6.40	-35.60	-13.00	22.60
5214	-60.35	-53	V	5.98	-47.02	-13.00	34.02
6083	-57.04	-47	V	6.06	-40.94	-13.00	27.94
6952	-57.6	-46	V	4.86	-41.14	-13.00	28.14
Mid Channel							
1763	-55.86	-53	V	5.35	-47.65	-13.00	34.65
2644.5	-59.45	-62	H	5.72	-56.28	-13.00	43.28
2644.5	-58.4	-59	V	5.72	-53.28	-13.00	40.28
High Channel							
1788	-56.12	-59	V	5.36	-53.64	-13.00	40.64
2682	-59.57	-59	V	5.74	-53.26	-13.00	40.26

7.6 Frequency Response

7.6.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The spectrum analyzer resolution and video bandwidths were set to 1MHz. The analyzer was set for Max Hold using a peak detector. Using a signal generator, both the uplink and downlink ports were driven with a CW signal. The frequency of the signal generator was sweep across the entire range of operation. Results of the test are shown below in and Figure 7.6-1 through 7.6-2.

7.6.2 Measurement Results

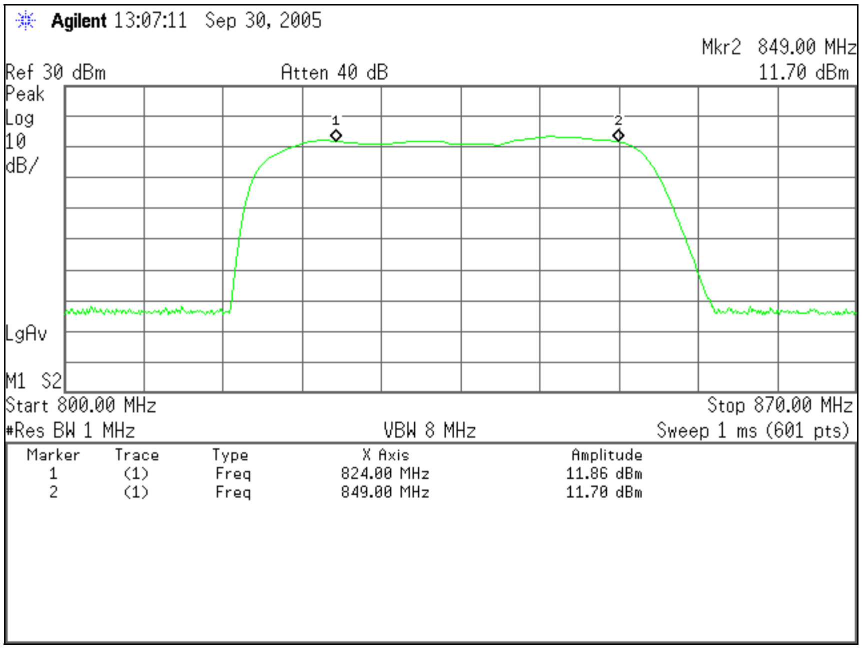

Figure 7.6-1: Frequency Response Uplink

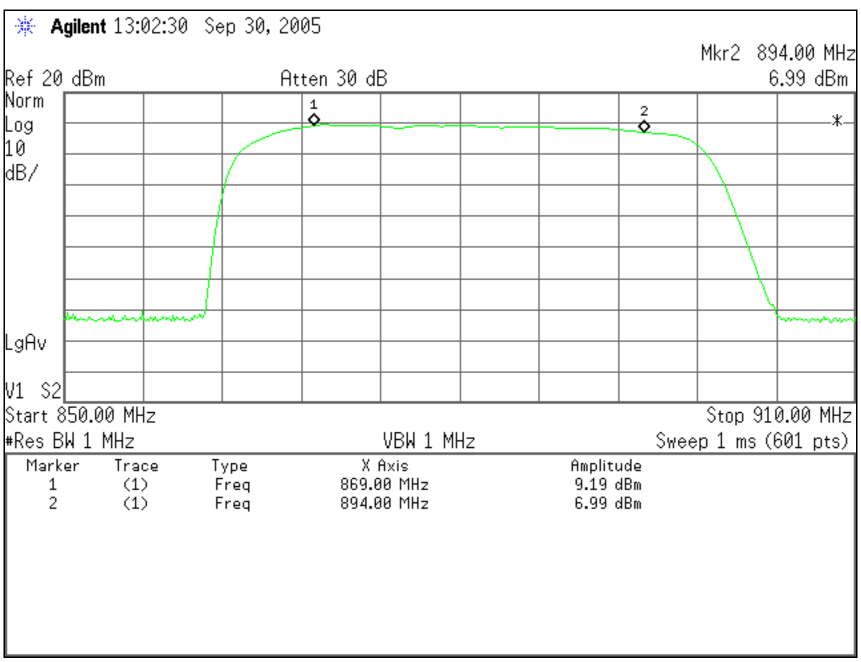

Figure 7.6-2: Frequency Response Downlink

7.7 Radiated Emissions (Unintentional Radiators) - FCC Section 15.109

7.7.1 Measurement Procedure

The equipment under test is placed on the Open Area Test Site (described in section 2.1) on a wooden table at the turntable center. For each radiated emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360º to obtain a maximum peak reading on the spectrum analyzer. The radiated emissions are then measured using an EMI receiver employing a CISPR quasi-peak detector for frequencies below 1000 MHz and an Average detector function for frequencies above 1000 MHz. This repeated for both horizontal and vertical polarizations of the receive antenna.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

Field Strength (dBuV/m) = EMI Receiver Level (dBuV) + Cable Loss (dB) – Amplifier Gain (dB) + Antenna Correction Factor (1/m)

Emissions were evaluated for all power supply combinations and the worst case emissions are reported.

Results of the test are shown below in Table 7.7.-1.

7.7.2 Measurement Results

Table 7.7-1: Radiated Emissions Tabulated Data

Frequency (MHz)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (°)	Corrected Reading (dBμV)	Limit (dBμV)	Margin (dB)
36.64	VERTICAL	100	30	33.5	40	6.5
42.40	VERTICAL	108	37	23.3	40	16.7
60.80	VERTICAL	100	278	17.3	40	22.7
85.20	HORIZONTAL	400	242	12.8	40	27.2
125.12	HORIZONTAL	250	98	9.4	43.5	34.1
212.08	HORIZONTAL	260	111	6.1	43.5	37.4
348.00	VERTICAL	110	139	12.0	46	34.0
498.96	VERTICAL	130	55	17.5	46	28.5
687.60	VERTICAL	392	12	22.0	46	24.0
955.60	VERTICAL	110	13	25.4	46	20.6

7.8 Power Line Conducted Emissions - FCC Section 15.107

7.8.1 Measurement Procedure

Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. Results of the test are shown below in and Tables 7.8-1 through 7.8-12 and Figure 7.8-1 through 7.8-6. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.8.2 Measurement Results – Fairway WT10L-050

Table 7.8-1: Line 1 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.198	46.4	9.9	63.6	17.2	L1	GND
0.336	41.6	9.9	59.3	17.6	L1	GND
0.666	41.7	9.9	56	14.2	L1	GND
1.266	44.6	10.0	56	11.3	L1	GND
1.944	38.0	10.0	56	17.9	L1	GND
2.274	35.9	10.0	56	20.0	L1	GND
4.998	26.2	10.1	56	29.7	L1	GND
8.268	19.3	10.1	60	40.6	L1	GND
28.494	25.0	10.4	60	34.9	L1	GND

Table 7.8-2: Line 1 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.198	34.8	9.9	53.6	18.8	L1	GND
0.330	32.4	9.9	49.4	17.0	L1	GND
0.714	28.5	9.9	46	17.4	L1	GND
1.266	31.4	10.0	46	14.6	L1	GND
1.272	33.0	10.0	46	13.0	L1	GND
1.866	25.4	10.0	46	20.5	L1	GND
2.268	23.4	10.0	46	22.5	L1	GND
4.956	14.3	10.1	46	31.6	L1	GND
8.280	11.5	10.1	50	38.4	L1	GND
28.464	15.3	10.4	50	34.6	L1	GND

Table 7.8-3: Line 2 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.198	45.3	9.9	63.6	18.3	L2	GND
0.336	41.6	9.9	59.3	17.6	L2	GND
0.672	43.3	9.9	56	12.6	L2	GND
1.278	47.6	10.0	56	8.3	L2	GND
1.680	37.3	10.0	56	18.6	L2	GND
1.950	38.4	10.0	56	17.5	L2	GND
2.286	38.0	10.0	56	17.9	L2	GND
4.644	26.4	10.0	56	29.5	L2	GND
28.380	23.2	10.4	60	36.7	L2	GND

Table 7.8-4: Line 2 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.198	33.9	9.9	53.6	19.7	L2	GND
0.330	33.2	9.9	49.4	16.2	L2	GND
0.660	33.5	9.9	46	12.4	L2	GND
1.272	32.9	10.0	46	13.1	L2	GND
1.278	34.2	10.0	46	11.7	L2	GND
1.674	23.0	10.0	46	22.9	L2	GND
1.950	26.7	10.0	46	19.2	L2	GND
2.286	26.8	10.0	46	19.1	L2	GND
4.704	14.7	10.1	46	31.2	L2	GND
28.296	15.2	10.4	50	34.8	L2	GND

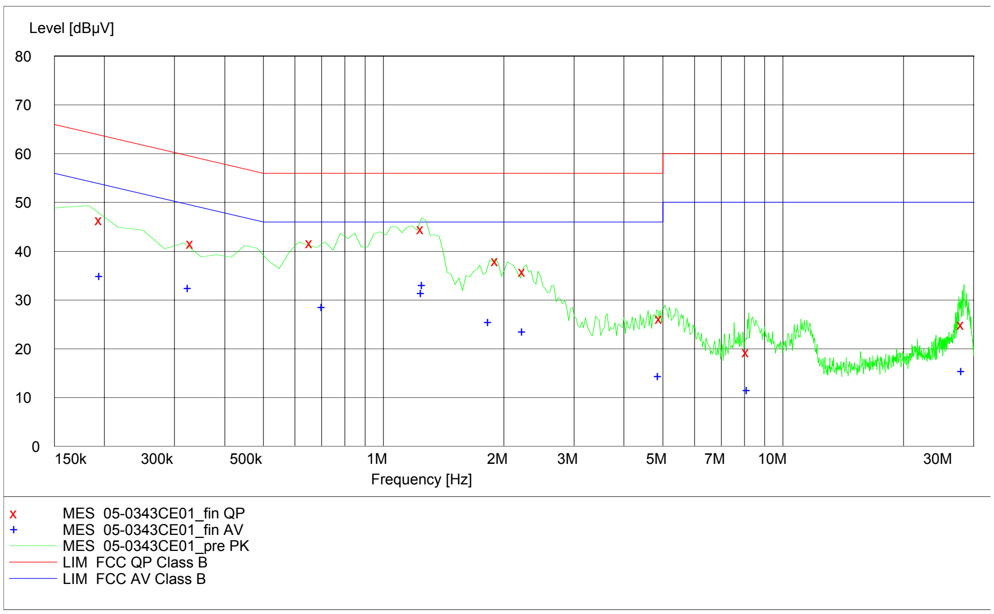

Figure 7.8-1: Conducted Emissions Graph – Line 1

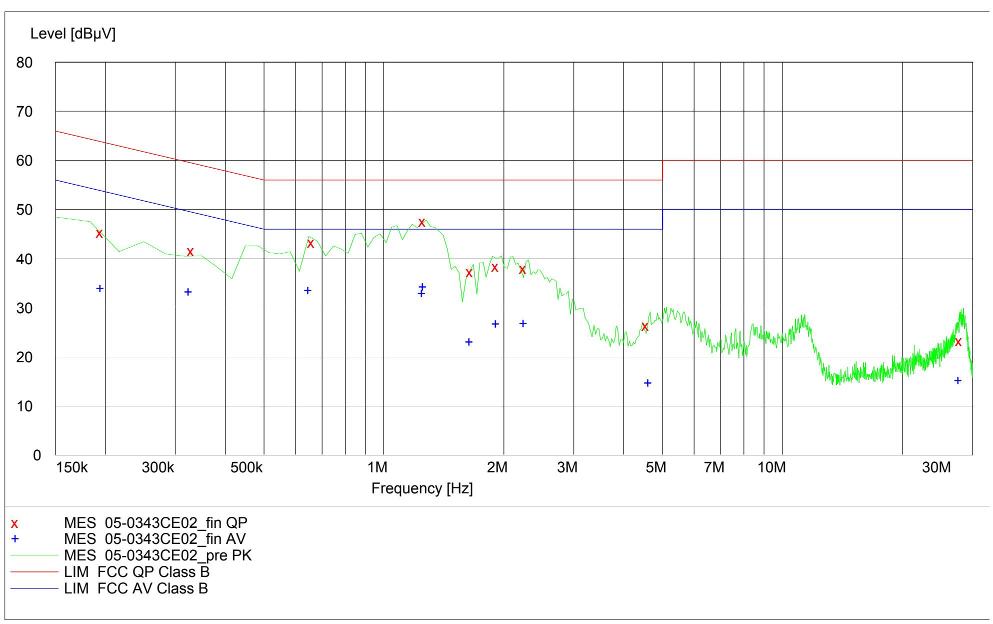

Figure 7.8-2: Conducted Emissions Graph – Line 2

Measurement Results – Fairway WT10A-050U

Table 7.8-5: Line 1 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.648	37.8	9.9	56	18.1	L1	GND
0.756	36.0	9.9	56	19.9	L1	GND
1.074	41.4	10.0	56	14.5	L1	GND
1.362	39.7	10.0	56	16.2	L1	GND
1.476	40.8	10.0	56	15.2	L1	GND
1.614	38.1	10.0	56	17.8	L1	GND
1.782	38.6	10.0	56	17.3	L1	GND
1.890	40.7	10.0	56	15.2	L1	GND
2.310	40.2	10.0	56	15.7	L1	GND
3.336	34.7	10.0	56	21.2	L1	GND

Table 7.8-6: Line 1 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.636	33.8	9.9	46	12.1	L1	GND
0.744	30.6	9.9	46	15.3	L1	GND
1.056	30.6	10.0	46	15.3	L1	GND
1.368	27.2	10.0	46	18.7	L1	GND
1.488	28.1	10.0	46	17.9	L1	GND
1.608	26.5	10.0	46	19.4	L1	GND
1.704	22.6	10.0	46	23.3	L1	GND
1.896	25.6	10.0	46	20.3	L1	GND
2.298	24.7	10.0	46	21.2	L1	GND
3.324	22.3	10.0	46	23.6	L1	GND

Table 7.8-7: Line 2 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.210	48.1	9.9	63.2	15.0	L2	GND
0.642	41.9	9.9	56	14.0	L2	GND
0.750	40.9	9.9	56	15.0	L2	GND
1.050	42.0	10.0	56	13.9	L2	GND
1.176	42.0	10.0	56	13.9	L2	GND
1.470	42.6	10.0	56	13.3	L2	GND
1.608	43.0	10.0	56	12.9	L2	GND
1.890	42.4	10.0	56	13.5	L2	GND
1.998	41.2	10.0	56	14.7	L2	GND
2.310	41.7	10.0	56	14.2	L2	GND

Table 7.8-8: Line 2 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.210	39.5	9.9	53.2	13.6	L2	GND
0.636	34.6	9.9	46	11.3	L2	GND
0.744	31.6	9.9	46	14.3	L2	GND
1.056	31.8	10.0	46	14.1	L2	GND
1.164	30.9	10.0	46	15.0	L2	GND
1.476	30.5	10.0	46	15.4	L2	GND
1.596	28.5	10.0	46	17.4	L2	GND
1.890	28.9	10.0	46	17.0	L2	GND
1.998	26.9	10.0	46	19.0	L2	GND
2.310	27.3	10.0	46	18.6	L2	GND

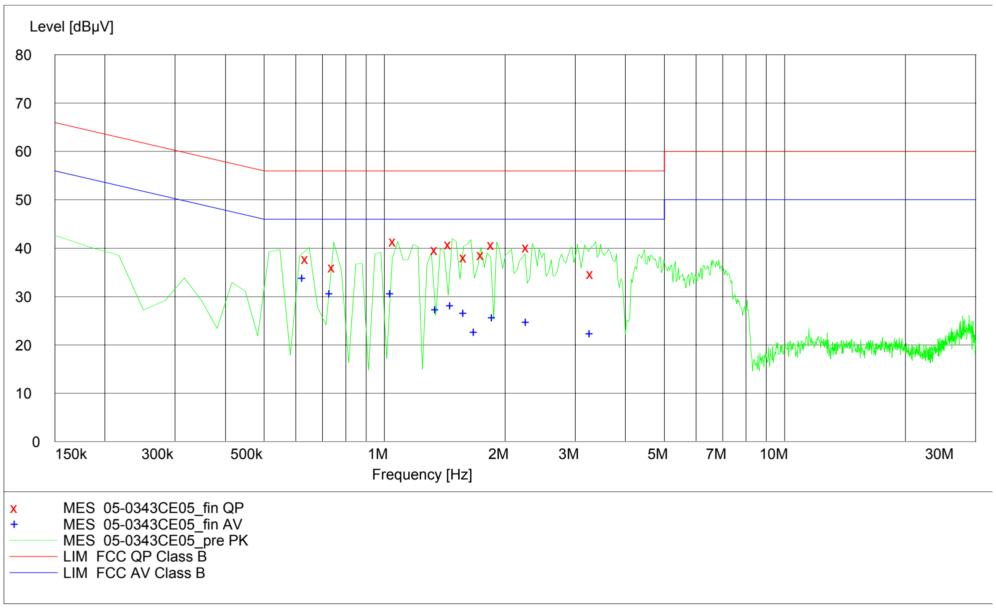

Figure 7.8-3: Conducted Emissions Graph – Line 1

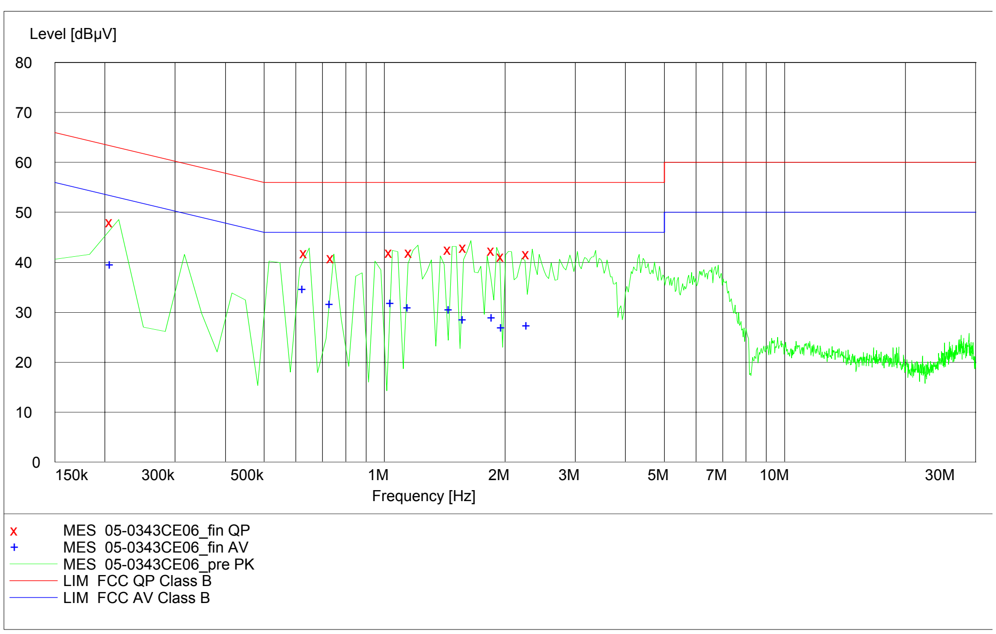

Figure 7.8-4: Conducted Emissions Graph – Line 2

<u>Measurement Results</u> – Fairway WN10A-050

Table 7.8-9: Line 1 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.312	46.3	9.9	59.9	13.5	L1	GND
0.462	39.9	9.9	56.6	16.6	L1	GND
0.618	45.9	9.9	56	10.0	L1	GND
0.756	23.5	9.9	56	32.4	L1	GND
0.774	48.0	10.0	56	7.9	L1	GND
0.930	43.9	9.9	56	12.0	L1	GND
1.224	39.4	10.0	56	16.6	L1	GND
1.242	45.5	10.0	56	10.4	L1	GND
1.524	16.0	10.0	56	39.9	L1	GND
1.848	39.1	10.0	56	16.9	L1	GND

Table 7.8-10: Line 1 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.312	43.2	9.9	49.9	6.6	L1	GND
0.462	36.8	9.9	46.6	9.8	L1	GND
0.618	43.7	9.9	46	2.2	L1	GND
0.756	17.5	9.9	46	28.4	L1	GND
0.774	44.5	10.0	46	1.4	L1	GND
0.924	39.5	9.9	46	6.4	L1	GND
1.224	29.4	10.0	46	16.5	L1	GND
1.236	41.2	10.0	46	4.7	L1	GND
1.458	9.0	10.0	46	36.9	L1	GND
1.854	32.2	10.0	46	13.7	L1	GND

Table 7.8-11: Line 2 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.156	47.9	10	65.6	17.7	L2	GND
0.312	46.6	9.9	59.9	13.2	L2	GND
0.462	41.1	9.9	56.6	15.4	L2	GND
0.618	47.0	9.9	56	8.9	L2	GND
0.774	48.7	10.0	56	7.2	L2	GND
0.930	43.3	9.9	56	12.6	L2	GND
1.080	43.2	10.0	56	12.7	L2	GND
1.230	45.6	10.0	56	10.3	L2	GND
1.860	40.5	10.0	56	15.4	L2	GND
2.172	38.5	10.0	56	17.4	L2	GND

Table 7.8-12: Line 2 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.156	47.1	10.0	55.6	8.4	L2	GND
0.312	43.3	9.9	49.9	6.5	L2	GND
0.462	38.3	9.9	46.6	8.2	L2	GND
0.618	45.1	9.9	46	0.8	L2	GND
0.774	44.9	10.0	46	1.0	L2	GND
0.924	39.1	9.9	46	6.8	L2	GND
1.080	39.9	10.0	46	6.0	L2	GND
1.236	40.7	10.0	46	5.2	L2	GND
1.848	34.1	10.0	46	11.8	L2	GND
2.160	31.5	10.0	46	14.4	L2	GND

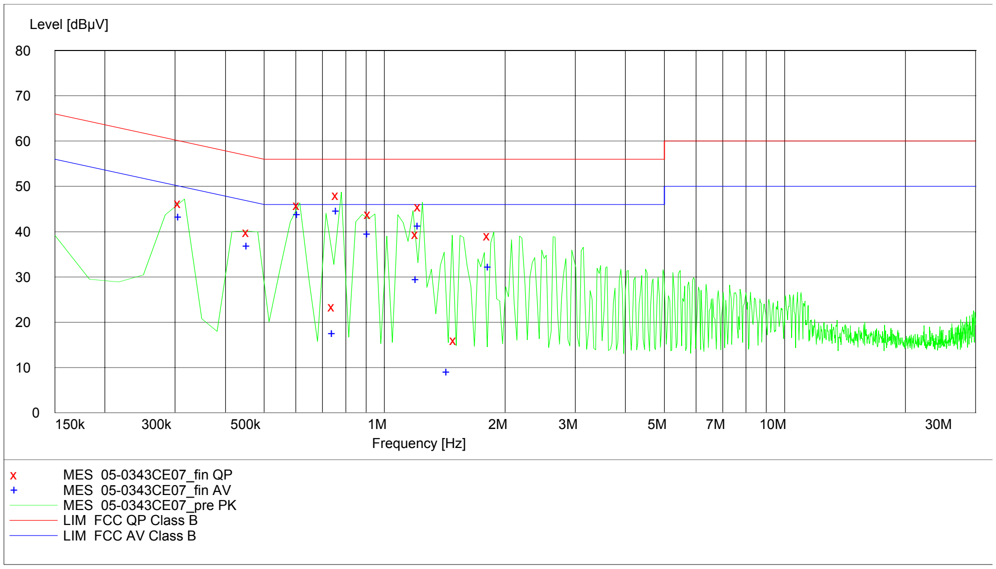

Figure 7.8-5: Conducted Emissions Graph – Line 1

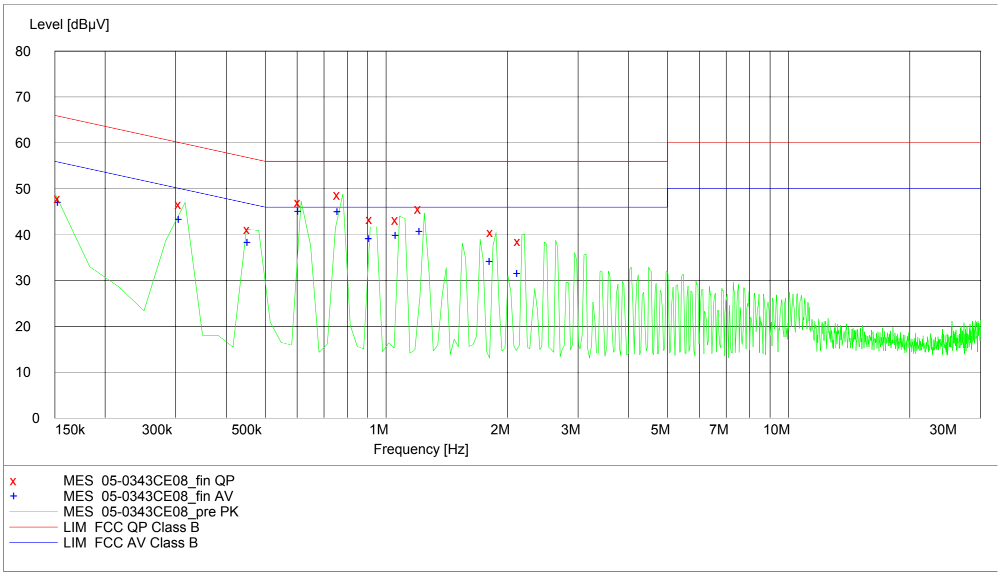

Figure 7.8-6: Conducted Emissions Graph – Line 2

END Report